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Pure MATHEMATICS 30

Module 3
Sequences and Series
Assignment Booklet 3A

Learning Technologies Branch

Alberta LEARNING

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Section 1 Assignment	30	

Teacher's Comments

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Parents	
General Public	
Other	

Pure Mathematics 30
Module 3: Sequences and Series
Assignment Booklet 3A
Section 1 Assignment
Learning Technologies Branch
ISBN 0-7741-1656-0

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ASSIGNMENT BOOKLET 3A
PURE MATHEMATICS 30: MODULE 3
SECTION 1 ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments in the Assignment Booklets.

This Assignment Booklet is worth 30 marks out of the total 100 marks for Module 3.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

(30)

Section 1 Assignment: Sequences

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. Find the general term that describes the following sequences:

(2) **a.** 600, 300, 150, 75

(2) **b.** $-12, -8, -4, 0, 4$

(3)

2. The following sequence is geometric:

$$\frac{4}{3}, \frac{4}{9}, \frac{4}{27}, \cdots$$

Determine the general term, t_n, and the tenth term, t_{10}.

(4)

3. Write the first three terms of $t_n = 5(2)^{n-1}$. What is the value of $\frac{t_n}{t_{n-3}}$?

(2) **4.** Write a recursive formula that generates the terms of the following:

1, 3, 9, 27, ...

(3) **5.** A new car depreciates by 20% in its first year. Each succeeding year it depreciates by 10%. Assume the car is still in good working condition after 10 years. If the car cost $25 000, calculate the value of the car after 10 years. Express your answer to the nearest $10.

(5) **6.** Determine two geometric sequences whose first three terms are $18x-9$, $2x+8$, and $x-1$.

(3) **7.** A finite geometric sequence has $t_1 = 0.1024$ and $t_2 = 0.256$. How many terms does this sequence have if its middle term has the value 156.25?

8. A recursive sequence is defined by $t_n = 2t_{n-1}$, where $t_1 = 5$.

(1) **a.** Determine the first five terms of this sequence.

(2) **b.** Would the points of the sequence, (n, t_n), lie on the graph of an exponential function, linear function, or neither? Explain your answer.

_____

_____

_____

(3) **9.** If the third and ninth term of a geometric series with a positive common ratio are -3 and -192 respectively, determine the value of the first term, a.

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Pure MATHEMATICS 30

Module 3

Sequences and Series

Assignment Booklet 3B

Learning Technologies Branch

Alberta LEARNING

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Section 2 Assignment	30	
Final Module Assignment	40	
	70	

Teacher's Comments

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Parents	
General Public	
Other	

Pure Mathematics 30
Module 3: Sequences and Series
Assignment Booklet 3B
Section 2 Assignment and Final Module Assignment
Learning Technologies Branch
ISBN 0-7741-1736-2

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ASSIGNMENT BOOKLET 3B
PURE MATHEMATICS 30: MODULE 3
SECTION 2 ASSIGNMENT AND FINAL MODULE ASSIGNMENT

Your mark for this module will be determined by how well you do your assignments in the Assignment Booklets.

This Assignment Booklet is worth 70 marks out of the total 100 marks for Module 3.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

(30)

Section 2 Assignment: Geometric Series

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

(3) **1.** For the geometric series $8+48+288+\ldots$, find the sum of the first ten terms, S_{10}.

2. Determine the sum of the following geometric series. Round your answers to 4 decimal places if necessary.

(3) **a.** $-\frac{1}{32}+\frac{1}{16}-\ldots+256$

(3) **b.** $\sum_{n=1}^{50} 8(0.5)^{n-2}$

(3) **c.** $\sum_{n=1}^{\infty} 5(0.2)^n$

(3) **3.** Write the following geometric series using sigma notation:

$$\frac{3}{32}+\frac{3}{16}+\ldots+12\,288$$

(4)

4. The sum of the sequences defined by $t_n = (0.75)^{n-1}$ and $t_n = \left(\frac{3}{8}\right)^{n-1}$ are compared. Determine the sum of an infinite number of terms for both sequences.

(4)

5. George entered a function into his calculator and found the following partial sums:

$S_1 = 0.0016$ $S_4 = 0.2496$

$S_2 = 0.0096$ $S_5 = 1.2496$

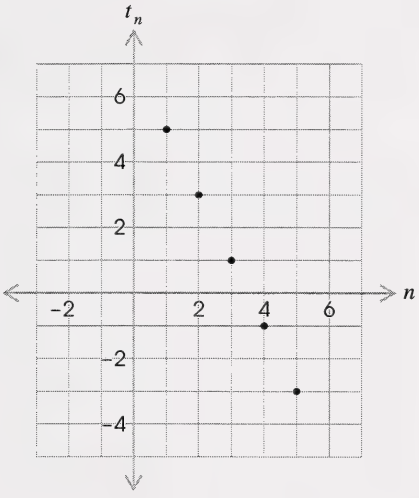
$S_3 = 0.0496$

Determine the general term of the corresponding sequence.

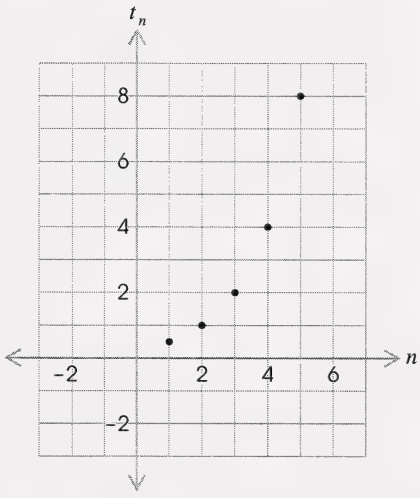
(4)

6. Each of the points on the following graphs are of the form (n, t_n), where t_n is either a geometric or arithmetic sequence. Identify the graph that represents a geometric sequence, justifying your answers. Then determine S_8 of the geometric sequence.

GRAPH A



GRAPH B



(3) **7.** Evaluate the sum of the following infinite geometric series:

$$5-\frac{5}{2}+\frac{5}{4}-\frac{5}{8}+\cdots$$

(40)

Final Module Assignment

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. Determine the first three terms of each the following sequences; then state whether the sequence is arithmetic, geometric, or neither.

(2) **a.** $t_n = 5t_{n-1} + 3$, where $t_1 = 2$

(2) **b.** $t_n = -3(4)^n$

(2) **c.** $t_n = 2 + 5n$

(4) **2.** The third term of a geometric sequence is $t_3 = -75$ and the sixth term is $t_6 = 9375$. Determine the first term and the common ratio.

(2) **3.** A sequence, t_n, is defined as all natural numbers that are neither perfect squares nor perfect cubes. Write the first ten terms of t_n.

_____

(4) **4.** An oil well produces 25 000 barrels of oil during its first month of production. The oil company predicts its production will drop 5% each month thereafter. How many barrels of oil will this company produce in its first year? Round your answer to the nearest thousand.

(3) **5.** Donna deposited some money into an account paying 8% per annum, compounded quarterly. When she goes into the bank 3 years later, she discovers that there is $1585.30 in her account. What was the initial amount Donna deposited?

6. Kenneth recently started a new job. His starting gross monthly salary is $3200. Each year, on the anniversary of his starting date, Kenneth is promised a 7% raise.

(4) **a.** If Kenneth works for 5 years, what was his gross annual income in his fifth year of work?

(4) **b.** What is the minimum number of years Kenneth will have to work to earn a gross annual income of at least $60 000?

(4) **7.** At a local grocery store, the bananas they receive are transported through three stages: from the farmer to the market, from the market to the wholesaler, and from the wholesaler to the grocery store. At each stage, the price of the bananas increases by 20% of the previous price.

If a person buys 80¢ worth of bananas at the grocery story, how much was the farmer paid for those same bananas? Round your answer to the nearest cent.

(2) **8.** **a.** Write $0.\overline{12}$ as a geometric series.

(2) **b.** Convert $0.\overline{12}$ to a fraction using the formula for an infinite geometric series.

9. The general term of an infinite sequence is $t_n = k(0.3)^{n-1}$, where $k \in R$.

(3) **a.** Determine an expression for the sum of the terms of this sequence in terms of k.

(2) **b.** If $\sum_{n=1}^{\infty} k(0.3)^{n-1} = 90$, determine the value of k using the expression you derived in question 8.a.

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Module 3

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